

the Upper Yenisei valley and the Punjab. A marked increase is also observable over the interior of the North American continent, while over the whole of central Europe a decided decrease has occurred. The *increase* over the various regions above referred to was as follows:—Over the North Atlantic, between 40° and 50° N., from 0.15 to 0.25 of an inch; between 50° and 60° N., from 0.20 in the ten degree square included by the meridians of 40° and 50° W. to 0.50 in the square included by the meridians of 20° and 30° W. Over the British Isles it was about 0.20 and at Stykkisholm, Iceland, 0.35. Over the southeastern part of Europe, about the Caspian sea region, it was 0.08. Over Asia it ranged from 0.10 in the Black sea and Bengal regions and at the mouth of the Amoor to 0.15 on the coast of China, 0.20 in the Punjab and 0.25 in the upper Yenisei valley. Over the interior of the North American continent it amounted to about 0.15 in Manitoba. The *decrease* over the Behring sea region amounted to 0.55 at St. Paul's Island, 0.39 at St. Michaels; over the Eastern Atlantic to 0.10 near the banks of Newfoundland and 0.05 at Godthaab, Greenland; and over central Europe to about 0.10. The area of absolute highest barometer (above 30.30 or 769.6, as reduced to sea-level) over the Northern Hemisphere, for the month, is found over the Asiatic continent, stretching in a southeasterly direction from the Sea of Aral, Barnaul and Yeniseisk to the coast of China, while smaller areas of over 30.10 or 764.5 are found over the Atlantic from 45° to 60° N, and 20° to 35° W, and over the southeastern and extreme western parts of the United States. The areas of absolute lowest barometer are found over Behring's sea, where the pressure averages about 29.25 or 743.0 and over the North sea, where it is about 29.65 or 753.1. The general direction of the *winds* during November, 1878, accords well with what might be expected from this distribution of pressure. Over the United States, except in the Rio Grande and Red River of the North valleys, where they were southerly; over the Atlantic, west of the 50th and east of the 25th meridian; over the extreme western portions of Europe; over Hindostan and along the eastern coast of Asia extending over Japan and Behring's sea, the directions were *northerly* or *westerly*; over the Atlantic between the 25th and 50th meridians, and over nearly the whole of Europe and northwestern Asia, *southerly*. The most notable winds of the month were probably the northerly winds over Western Europe and Hindostan, giving to the former region a temperature below the average, and to the latter a complete cessation (about the 12th of the month) to the monsoon rains.

On chart No. VI are traced the paths of twenty-eight of the principal storm-areas of the Northern Hemisphere for the month of November, 1878. Only one of them, (No. XXV, the track of which is doubtful) presented the characteristics of a tropical cyclone. Perhaps the two most striking peculiarities of the storms, during this month, were (1) the recurving of the paths of several of them towards the west, as most plainly shown by areas Nos. I, VI, XI and XX, and (2) the heavy precipitation attending the various storms, during their northeasterly movement over the eastern portion of the United States and Central Europe.

## TEMPERATURE OF THE AIR.

The mean temperature of the air for July, 1880, is shown by isotherms on chart No. II. The table of comparative temperatures given on the right hand side of this chart shows the temperature during July to have been *below the normal* over the whole of the United States, except along the Atlantic coast and at San Francisco. This, in connection with the average high mean temperatures recorded for the majority of districts east of the Rocky Mountains since the month of October, 1879, is very interesting.

*Maximum Temperatures.*—*Maine:* 95° at \*Orono, 94° at Portland. *New Hampshire:* 100° at \*Dunbarton, (62° on summit of Mt. Washington). *Vermont:* 99° at \*Charlotte, 89° at Burlington. *Massachusetts:* 101° at Boston, 100° at \*Somerset. *Rhode Island:* 88° at Newport. *Connecticut:* 97° at \*Mystic, 88° at New London. *New York:* 96° at \*Ardenia, 91° New York City, 85° at Buffalo. *New Jersey:* 99° at Atlantic City and \*Moorestown. *Pennsylvania:* 96° at \*Chambersburg, \*Egypt and \*Wellsboro, 95° at Philadelphia. *Delaware:* 97° at \*Dover. *Maryland:* 99° at Baltimore. *District of Columbia:* 98° at Washington. *Virginia:* 102° at Norfolk. *West Virginia:* 89° at Morgantown. *North Carolina:* 104° at \*Weldon, 98° at Wilmington. *South Carolina:* 97° at Charleston. *Georgia:* 100° at \*Forsyth, 96° at Augusta. *Florida:* 100° at \*Houston, 97° at Key West and Jacksonville. *Alabama:* 100° at Montgomery. *Mississippi:* 97° at Vicksburg. *Louisiana:* 101° at Point Pleasant, 96° at Shreveport. *Texas:* 108° at Eagle Pass, 103° at Laredo, Rio Grande and Edinburg, 102° at Stockton, 101° at Denison, Pilot Point, Concho and Castroville, 100° at Griffin, McKavett and Decatur. *Ohio:* 98° at \*Jacksonburg, 97° at Columbus. *Kentucky:* 95° at Louisville. *Tennessee:* 95° at Memphis, Nashville and Chattanooga. *Arkansas:* 96° at \*Mt. Ida, 95° at Little Rock. *Michigan:* 95° at \*Niles, 93° at Detroit. *Indiana:* 97° at \*Laconia, 93° at Indianapolis. *Illinois:* 100° at \*Louisville, 96° at Springfield. *Missouri:* 98° at \*Corning, 95° at St. Louis. *Kansas:* 103° at \*Ft. Wallace and 95° at Leavenworth. *Wisconsin:* 95° at Ea Crosse. *Iowa:* 98° at Keokuk. *Nebraska:* 98° at \*Genoa, 97° at North Platte and Omaha. *Indian Territory:* 100° at Ft. Gibson. *Minnesota:* 90° at \*Minneapolis. *Dakota:* 98° at Ft. Keogh. *Colorado:* 95° at Denver. *New Mexico:* 107° at La Mesilla. *Wyoming:* 93° at Cheyenne. *Utah:* 95° at Salt Lake City. *Nevada:* 96° at Winnemucca. *Arizona:* 110° at Yuma and Burkes. *Idaho:* 98° at Boise City.

*Montana*: 86° at Virginia City. *California*: 108° at Red Bluff, 105° at Visalia. *Oregon*: 107° at Umatilla. *Washington Territory*: 94° Olympia.

Those marked with a star (\*) are reported by U. S. Army Post Surgeons or Voluntary Observers.

*Minimum Temperatures*.—*Maine*: 47° at \*Gardiner, 48° at Eastport and \*Orono. *New Hampshire*: 31° on summit of Mt. Washington, 44° at \*Dunbarton and Crafton. *Vermont*: 43° at \*Woodstock, 49° at Burlington. *Massachusetts*: 48° at \*South Lee; 52° at Boston. *Rhode Island*: 58° at Newport. *Connecticut*: 55° at New London. *New York*: 43° at \*Waterburg, 52° at Rochester, 59° at New York City. *New Jersey*: 53° at Atlantic City and \*Newark. *Pennsylvania*: 42° at \*Franklin, 53° at Pittsburg. *Delaware*: 64° at \*Dover. *Maryland*: 45° at \*Cumberland, 62° at Baltimore. *District of Columbia*: 59° at Washington. *Virginia*: 52° at Wytheville. *West Virginia*: 53° at Morgantown. *North Carolina*: 52° at \*Highland, 63° at Charlotte. *South Carolina*: 71° at Charleston. *Georgia*: 64° at Atlanta. *Florida*: 69° at Pensacola and Punta Rassa. *Alabama*: 69° at Montgomery. *Mississippi*: 64° at Vicksburg. *Louisiana*: 64° at Shreveport. *Texas*: 43° at Fredericksburg, 49° at Ft. Elliott, 57° at Pilot Point. *Ohio*: 52° at Cleveland. *Kentucky*: 60° at Louisville. *Tennessee*: 59° at Nashville. *Arkansas*: 59° at \*Mt. Ida, 62° at Little Rock. *Michigan*: 43° at Marquette, 52° at Detroit. *Indiana*: 52° at \*Spiceland, 55° at Indianapolis. *Illinois*: 46° at \*Marengo, 55° at Springfield. *Missouri*: 49° at \*Pierce City, 59° at St. Louis. *Kansas*: 53° at \*Yates Centre and \*Wellington, 56° at Leavenworth. *Wisconsin*: 49° at \*Neillsville, 52° at La Crosse. *Iowa*: 48° at \*Nora Springs, 52° at Davenport. *Nebraska*: 54° at Omaha. *Indian Territory*: 55° at Ft. Gibson. *Minnesota*: 57° at \*Minneapolis. *Dakota*: 42° at Deadwood. *Colorado*: (28° on summit of Pike's Peak,) 32° at \*Summit, 49° at \*Hermosa. *New Mexico*: 46° at Santa Fé. *Wyoming*: 49° at Cheyenne. *Utah*: 45° at Salt Lake City. *Nevada*: 41° at Winnemucca. *Arizona*: 60° at Burkes. *Idaho*: 41° at Boise City. *Montana*: 37° at Virginia City. *California*: 51° at San Francisco, 55° at Sacramento. *Oregon*: 45° at Roseburg. *Washington Territory*: 42° at Olympia.

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*Ranges of Temperature*.—The monthly ranges will appear from an examination of the above minimum and maximum temperatures. The greatest daily ranges vary as follows: New England, from 18° at Wood's Holl to 32° at Eastport; Middle Atlantic States, 19° at Cape May to 24° at Albany and 29° at Norfolk; South Atlantic States, 15° at Cape Lookout to 25° at Jacksonville and 26° at Wilmington; Eastern Gulf States, 15° at New Orleans to 26° at Montgomery; Western Gulf States, 16° at Galveston to 28° at Corsicana; Ohio valley and Tennessee, 21° at Cairo to 32° at Pittsburg; Lower Lakes, 19° at Erie to 28° at Cleveland; Upper Lakes, 20° at Chicago to 36° at Duluth; Upper Mississippi valley, 23° at La Crosse to 29° at Des Moines; Red river of the North valley, 34° at Breckenridge to 38° at Pembina; Missouri valley, 25° at Omaha to 37° at Fort Stevenson and 40° at Bismarck; Texas, 24° at San Antonio to 28° at Rio Grande City and 34° at Fort Elliott; Eastern Rocky Mountain Slope, 26° at Fort Sill to 36° at North Platte and 48° at Fort Keogh; Rocky Mountains, 23° on summit of Pike's Peak to 33° at Virginia City and 40° at Cheyenne; Western Plateau, 33° at Salt Lake City, to 39° at Boise City and 46° at Winnemucca; California, 20° at San Francisco to 35° at Red Bluff and 40° at Visalia.

Ice was reported on the summit of Mount Washington, 29th; at Summit, Rio Grande Co., Col., 11th and 30th.

*Frost*.—*Utah*.—Salt Lake City, 12th. *Colorado*.—Summit of Pike's Peak, 6th, 17th, 18th, 26th, 27th, 30th, and 31st. At Summit, Rio Grande Co., frequent. *New Hampshire*.—Summit of Mount Washington, 29th.

## PRECIPITATION.

The general distribution of rain-fall, for July, 1880, is shown on chart No. III, as accurately as possible, from about 500 reports. The table on this chart shows the average precipitation for the several districts compared with the normal values. The rain-fall has been above the normal along the Gulf and Atlantic coasts, in the St. Lawrence valley and Upper Lake region, about normal over the Lower Lakes and Lower Missouri valley and below normal elsewhere. The characteristic features of the rains during the month have been (1) their local nature, (2) their short duration and (3) their copiousness. Thus, in Kansas and Missouri, while heavy rains fell during the first few days of the month, during the latter part of the month both states suffered from drought. In the paragraph on Specially Heavy Rains, some remarkable records will be found, among which may be noted a heavy rain-fall of 1½ inch in 8 minutes at Paterson, N. J.

*Special Heavy Rains*.—1st, Independence, Ia., 1.75 inches in 45 minutes; St. Louis, 2.07 in. 1st and 2nd, College Hill, Cincinnati, Ohio, 3.25. 2nd, Lacopia, Ind., 2.74 in; Mexico, Mo., 3.88. 2nd and 3rd, McMinnville, Tenn, 3.98; Stratford, Vt., 3.50; Leavenworth, 5.11; Mystic, Conn., 2.95 in; Woodstock, N. H., 4.00 in. 3rd, Socorro, N. M., 1.14 in.; Rowe, Mass., 1.80 in. in 2 hours. 4th, Ft. Sill, Ind. Ty., 2.31. 5th, Fallsington, Pa., 5.38; Sandy Springs, Md., 5.00 in. in 2 hours and 30 minutes; White Plains, N. Y., 1.80 in. in 6 hours; Somerville, N. J., 4.34 in. 5th and 6th, Trenton, N. J., 4.13 in.; Princeton, N. J., 4.44 in.; Trenton, N. J., 6.72 in.; New Brunswick, N. J., 2.53 in.; Linden, N. J., 2.34 in.; Paterson, N. J., 2.22 in.; Somerville, N. J., 2.08 in. 6th, Mesquite, Tex., 2.00 in.; Ft. Randall, Dak., 2.50 in. 7th, Omaha, Neb., 2.42 in.; Clear Creek, Neb., 2.50 in. in 20